

REMARKS

Claims 51-64 are pending in the present application. The Examiner finally rejected the claims as being unpatentable in view of Vaartstra (US 6242165 B1), Smith, Jr. et al. (US 5863348), McConnell et al. (US 4917123) and Shortes et al. (US 4341592). Applicants herewith submit a Request for Continued Examination pursuant to 37 C.F.R. § 1.114 with this Amendment as the requisite submission. With entry of this Amendment, Applicants amend claims 51, 53 and 59. Reexamination and reconsideration are respectfully requested.

The present invention is directed to a substrate processing apparatus that employs a mixed gas molecular layer of solvent vapor molecules and process gas molecules to alter a resist film on a substrate into a water-soluble substance. Forming the mixed gas molecular layer requires coordinating the temperature of the substrate with the temperature of the solvent vapor. For example, if the solvent vapor is steam, the temperature of the substrate must be above the dew point of the steam and lower than the temperature of the steam. (See, e.g., the specification at page 20, lines 27-37.) Otherwise the steam condenses on the substrates and inhibits the formation of a mixed gas molecular layer. The present invention commonly controls the heater for the solvent vapor and the heater of the processing vessel to coordinate the proper temperatures for the solvent vapor and the substrate.

Applicants have amended claim 51 to recite “means” for “controlling the solvent heater and the main heater to control a temperature of the substrate and a temperature of the solvent vapor such that a mixed gas molecular layer of a mixture of molecules of the solvent vapor and molecules of the process gas is formed on the substrate to alter the resist film into a water-soluble substance.” Dependent claims 53 and 59 have also been amended in view of the amendment to claim 51.

This amendment seeks to place the recitation within the scope of § 112, paragraph 6. Pursuant to the USPTO examination guidelines, the prior art element must perform the identical function specified in the claimed recitation. See, e.g., MPEP 2182 (“Both before and after *Donaldson*, the application of a prior art reference to a means or step plus function requires that the prior art element perform the identical function specified in the claim.”)

In the Office Action, the Examiner gave little weight to the “for controlling . . .” recitation of claim 51, because he believed it recited an intended use. However, in view of the present amendment, the Examiner must give weight to the recited function.

Neither Vaarstra nor Smith, Jr., which the Examiner cited in rejecting claim 51, discloses an element that performs the identical function.

Vaartstra is directed to cleaning a substrate with a supercritical fluid. The fluid is made supercritical by heating the fluid to its supercritical temperature. The supercritical temperature can be reached near mixing manifold 122 by heater 124. The supercritical temperature can also be reached in pressure vessel 114 through heater inputs 132. The Examiner cites heaters 124 and 132 as reading on the solvent vapor heater and main heater of claim 51.

According to the Examiner, the type of heater 124 used in Vaartstra is well-known to include a temperature controller. Vaartstra discloses a temperature control unit 130 for heater inputs 132 of vessel 114. Control unit 130 monitors the temperature of pressure vessel 114 through thermocouple 128 and controls heater inputs 132 ensure that the temperature of the vessel is at or above the supercritical temperature. (See Col. 9, lines 38-47.)

Vaartstra, however, does not disclose that control unit 130 controls heater 124 and heater 132. As clearly illustrated in Figure 2, control unit 130 is not in any way connected to heater 124. Thus, even if one accepts the Examiner’s position that heater 124 is controlled (which is accepted here only for the sake of argument), there is no disclosure or suggestion that control unit 130 controls it. Control unit 130 thus fails to perform the function of “controlling the solvent heater and the main heater to control a temperature of the substrate and a temperature of the solvent vapor such that a mixed gas molecular layer of a mixture of molecules of the solvent vapor and molecules of the process gas is formed on the substrate to alter the resist film into a water-soluble substance.”

Smith, Jr. likewise fails to disclose the recited function. Smith, Jr. is directed to cleaning semiconductor elements. The elements are either immersed in a liquid or sprayed with a liquid. (See, e.g., Col. 3, lines 3-11.) Smith, Jr. discloses heating the liquid before use as well as the

cleaning chamber 10. (See heater 222 in Fig. 7 and Col. 7, lines 20-23 and 32-35). Smith, Jr. further discloses that temperature sensors (e.g., 410 and 426) are monitored by a computer 200 which adjusts “variables of operation such as temperature” (See Col. 7, line 64 to Col. 8, line 14).

There is no disclosure or suggestion of controlling heater 222 and the heating of chamber 10 to control the temperature of a solvent *vapor* and a substrate to form a mixed gas molecular layer. Smith, Jr. is directed to liquid processing and, thus, does not perform “controlling the solvent heater and the main heater to control a temperature of the substrate and a temperature of the solvent vapor such that a mixed gas molecular layer of a mixture of molecules of the solvent vapor and molecules of the process gas is formed on the substrate to alter the resist film into a water-soluble substance.”

Nor is there any motivation to combine Vaartstra with the control disclosed in Smith, Jr. as the Examiner apparently proposed. Unlike the present invention where the temperatures of different objects (i.e., the solvent vapor and the substrate) have to be coordinated and requires common control of both the solvent heater and the main heater, the process of Vaartstra requires no such common control. All that is required in Vaartstra is reaching the supercritical temperature of the fluid. This is a known value based on the fluid used. Each unit – the mixing manifold 122 or vessel 114 – can be independently controlled to ensure that temperature is achieved. There is no need for common control of the heaters. Vaartstra reflects this conclusion because it discloses a temperature control unit solely for the heater inputs to the processing vessel and, thus, teaches away from modifying the control unit as proposed by the Examiner.

Accordingly, Applicants respectfully submit that claim 51 is patentable over Vaartstra and Smith, Jr.

Applicants respectfully submit that dependent claims 52-60, 63 and 64 are patentable over Vaartstra and Smith, Jr. for at least the reasons set forth above.

McConnell and Shortes were merely cited for recitations in dependent claims 61 and 62, and its believed that they do not make up for the deficiencies of Vaartstra and Smith, Jr.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

If, for any reason, the Examiner finds the application other than in condition for allowance, Applicants request that the Examiner contact the undersigned attorney at the Los Angeles telephone number (213) 892-5630 to discuss any steps necessary to place the application in condition for allowance.

In the unlikely event that the transmittal letter is separated from this document and the Patent Office determines that an extension and/or other relief is required, Applicants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing Docket No. 199372002501.

Dated: December 2, 2005

Respectfully submitted,

By 

Mehran Arjomand

Registration No.: 48,231

MORRISON & FOERSTER LLP

555 West Fifth Street, Suite 3500

Los Angeles, California 90013

(213) 892-5200